US008600553B2

US008600553B2

(12) **United States Patent**
Svendsen et al.

(10) **Patent No.:** **US 8,600,553 B2**
(45) **Date of Patent:** **Dec. 3, 2013**

(54) **COVERAGE ROBOT MOBILITY**

(75) Inventors: **Selma Svendsen**, Andover, MA (US);
Daniel N. Ozick, Newton, MA (US);
Christopher M. Casey, Lexington, MA
(US); **Deepak Ramesh Kapoor**,
Cranston, RI (US); **Tony L. Campbell**,
Pepperell, MA (US); **Chikyung Won**,
Tewksbury, MA (US); **Christopher
John Morse**, Malden, MA (US); **Scott
Thomas Burnett**, Windham, NH (US)

(73) Assignee: **iRobot Corporation**, Bedford, MA (US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 1459 days.

(21) Appl. No.: **11/758,289**

(22) Filed: **Jun. 5, 2007**

(65) **Prior Publication Data**

US 2008/0091305 A1   Apr. 17, 2008

Related U.S. Application Data

(63) Continuation of application No. 11/633,885, filed on
Dec. 4, 2006, now Pat. No. 7,441,298.

(60) Provisional application No. 60/741,442, filed on Dec.
2, 2005.

(51) **Int. Cl.**
B25J 19/02   (2006.01)
(52) **U.S. Cl.**
USPC **700/258**; 318/580
(58) **Field of Classification Search**
USPC 700/258, 245, 246, 249, 250, 256, 259,
700/261; 701/23, 25; 318/568.1, 568.12,
318/580, 581, 587, 567, 568.18; 901/1, 46,
901/47; 15/319
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,755,054	A	4/1930	Darst
1,780,221	A	11/1930	Buchmann
1,900,885	A	3/1933	Smellie

(Continued)

FOREIGN PATENT DOCUMENTS

AU	2003275566 A1	6/2004
DE	21 28 842	12/1980

(Continued)

OTHER PUBLICATIONS

PCT International Search Report, May 6, 2007.

(Continued)

Primary Examiner — Dalena Tran
(74) *Attorney, Agent, or Firm* — Fish & Richardson P.C.

(57)   **ABSTRACT**

An autonomous coverage robot includes a drive system, a
bump sensor, and a proximity sensor. The drive system is
configured to maneuver the robot according to a heading
(turn) setting and a speed setting. The bump sensor is respon-
sive to a collision of the robot with an obstacle in a forward
direction. A method of navigating an autonomous coverage
robot with respect to an object on a floor includes the robot
autonomously traversing the floor in a cleaning mode at a full
cleaning speed. Upon sensing a proximity of the object for-
ward of the robot, the robot reduces the cleaning speed to a
reduced cleaning speed while continuing towards the object
until the robot detects a contact with the object. Upon sensing
contact with the object, the robot turns with respect to the
object and cleans next to the object, optionally substantially at
the reduced cleaning speed.

25 Claims, 21 Drawing Sheets